

Exploring the 2:1 resonance using the Outer Solar System Origin Survey

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Resonant dynamics plays a significant role in the evolution and current state of our outer Solar System. Details in the fine structure of resonant populations are clues to understanding the past evolution of the planetary system. The structure of 2:1 resonance (with Neptune), whose members are sometimes called "Twotinos", was pointed out in the literature as a potential tracer of planetary migration processes. Different migration rates could produce distinct architectures which could be detected by well-understood observational survey.

The Outer Solar System Origins Survey (OSSOS) is a large program on the Canada-France-Hawaii Telescope, executed from 2013 to 2017. This survey has detected, and most importantly tracked, nearly 1000 TNOs in set of fields both on and off the ecliptic plane. The use of a well-designed cadence allowed the determination of very precise orbital parameters, providing accurate measures of the resonance particle's liberation center and amplitude, which are the keys to estimating the intrinsic population and provide the end-state for theoretical models. Using the OSSOS twotino detections and the OSSOS survey simulator, we constrain the possible range of the eccentricity and the slope of size distribution. We also constrain the fraction of symmetric and asymmetric twotinos, and the ratio of the leading and trailing islands of the 2:1 resonance.